POINT PAPER
on
INDUSTRY APPRENTICESHIP
AND JOURNEYMAN TRAINING

APRIL 1994

Training Standards and Coordination Program

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PURPOSE

The purpose of this paper is to describe in detail the requirements that must be satisfied to successfully complete an apprenticeship program as defined by the U.S. Department of Labor (DOL). DOL requires completion of the apprenticeship program as a prerequisite for advancement to journeyman status. This study was conducted as a result of the inconsistent interpretation or insufficient understanding of the progression to journeyman, and in particular to determine the content of the typical apprenticeship program. This information is necessary because entry-level knowledge and experience requirements for maintenance positions at nuclear facilities (commercial and DOE) are based on the assumption that the new-hire is a journeyman.

BACKGROUND

Training and qualification programs for maintenance personnel who staff Department of Energy nuclear facilities vary considerably from site-to-site. These variations are the result of different interpretations by operating contractors of both the entry-level knowledge and skills of the positions and the requirements that establish the programs. Within DOE there are three orders that focus on training and qualification of maintenance personnel: 4330.4A MAINTENANCE MANAGEMENT PROGRAM, 5480.18A ACCREDITATION OF PERFORMANCE-BASED TRAINING FOR CATEGORY A REACTORS AND NUCLEAR FACILITIES, and 5480.20 PERSONNEL SELECTION, QUALIFICATION, TRAINING, AND STAFFING REQUIREMENTS AT DOE REACTOR AND NON-REACTOR NUCLEAR FACILITIES. Other factors also complicate the issue of maintenance training.

Most states and labor unions require a minimum amount of training and experience for an individual to be a journeyman craftsman. Some states require a state license or a minimum number of hours of training and a minimum number of hours on the job to be considered a journeyman in a specific craft. These requirements vary from state to state and from region to region. Because of this wide variation, individuals may have to requalify if moving to a different state or region.

This paper also provides the status of the apprenticeship and journeyman qualification requirements as interpreted by different facilities to the requirement of DOE Orders. Other areas that are addressed in this paper are: existing maintenance training programs (job, task/duty area, building/facility, or other), training settings, supervisor training, and existing continuing training programs.

APPRENTICESHIP PROGRAMS

The U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training (BAT), administers the requirements of 29 CFR Part 29, Labor Standards for the Registration of Apprenticeship Programs. This regulation establishes the standards for apprenticeship programs. Attachment 1 addresses the

standards an apprenticeship program must meet to be in compliance with 29 CFR Part 29. Apprenticeship programs are planned, administered, and paid for by the employer, employer associations, and labor unions. An Apprenticeship Committee consisting of employer crafts and management, bargaining unit, and apprenticeship school (vocational school, college, etc.) personnel oversee the apprenticeship program. Apprenticeship programs are commonly registered with the BAT or a federally approved State agency. Currently 27 states have federally approved apprenticeship agencies. Other states have the BAT oversee their apprenticeship programs.

Registered programs meet federally approved standards relating to job duties, related instruction (a minimum of 144 hours a year is recommended), wages, and safety and health conditions. Apprentices who successfully complete registered programs receive certificates of completion from the BAT or a federally approved State agency. Registered programs offer apprenticeships in over 830 occupations.

Apprentices can be in registered programs sponsored jointly by employers and labor unions or by employee/employer associations. The administrative body of these programs is called Apprenticeship and Training Committee. Representing the union or employer, the Apprenticeship Committee reviews applications for apprenticeships and interviews applicants. The Committee also consults with the BAT or a State apprenticeship counsel concerning apprenticeship standards, equal employment opportunity, safety, and similar matters.

Apprenticeship is the relationship between an employer and an employee during which the worker, or apprentice, learns an occupational trade. The training lasts a specified length of time. Apprenticeship programs cover all aspects of the trade and includes both on-the-job training and related instruction.
Classroom training is taught by experienced craft workers and other skilled persons and includes detailed discussion of how typical tasks are performed and the safety precautions that must be taken. Classes require the study of trade manuals and educational materials and can be scheduled during the day or in the evening.

Apprenticeship programs are usually four years in length, but may range from 1 to 6 years in length. During this time, apprentices work with journeyman workers to achieve the skills and knowledge of the occupational trade. The apprentice gradually learns the mechanics of the trade and performs the work with less and less supervision.

Required Training

Many apprenticeship programs are administered through local vocational schools or colleges. Some colleges allow apprentices to obtain an Associate of Applied Science Degree by taking an additional 12-15 credit hours of an approved curriculum after successfully completing a certified BAT apprenticeship program. Apprenticeship programs are registered with the BAT or a federally approved State agency. These programs must meet federally approved standards of instruction (a minimum of 144

hours a year is recommended). This instruction is usually off-the-job and held during the apprentice's off-work hours. The employer will normally pay for these classes. If an apprentice fails to pass a class, an interview with the Apprenticeship and Training Committee may be conducted to verify that the apprentice is suitable to stay in the apprenticeship program.

Apprentices are required to achieve a minimum passing grade when attending classes. They are required to attend a minimum of number of the required classes. The availability of these classes is the responsibility of the Apprenticeship and Training Committee. Attachment 3 is an example of the courses required for electricians and the required number of hours for these courses.

Work Experience

Registered apprenticeship programs must meet federally approved standards relating to job duties (work process). The work process is normally on-the-job (OJT) instruction where predefined work processes are demonstrated by a qualified journeyman and the apprentice is allowed to perform each work process. The work process instruction includes basic skills and the use of tools and equipment. Each work process is assigned an approximate number of required hours of learning. The order in which the work experience is obtained need not follow the sequence of the work process schedule, but during the term of apprenticeship the apprentice will be given at least the minimum number of hours of experience scheduled for each process. The work process hours are totaled and the hours are registered with the approved apprenticeship program as the minimum work training experience required for apprenticeship programs.

It is the responsibility of the apprentice to record the number of hours worked in each work process and have this reviewed periodically by their foreman or supervisor. The Apprenticeship Committee also reviews the apprentice's record book to ensure they are fulfilling their obligation to the apprenticeship program. Attachment 4 contains an example of the work processes required for electricians and the required number of hours for each work process.

Apprenticeship Completion

In order to complete the apprenticeship program, the apprentice must successfully complete a comprehensive examination and/or a practical evaluation with a passing grade of 80%. The Apprenticeship Committee reviews the apprentices record book and the final evaluation (written examination and/or practical evaluation) to ensure that all requirements have been met. After meeting all program requirements, the apprentice receives a Certificate of Completion of Apprenticeship from the BAT or a federally approved State agency.

Other Journeyman Qualifications

Many labor unions allow individuals who have not gone through an approved apprenticeship program to join the union as a journeyman providing the individual provides a notarized affidavit stating that the minimum number of years of required experience have been completed. Most labor unions require the individual to complete the same final apprenticeship test with the same minimum passing grade and complete a practical evaluation before being considered for entry into the labor union as a journeyman craftsman.

Individuals meeting the minimum requirements must pay an initiation fee once approval is obtained to join the labor union as a qualified journeyman. Labor unions do this to ensure that only qualified personnel are journeyman craftsman.

DOE FACILITY PRACTICES

DOE facilities have many different practices that apply when hiring a journeyman craftsman. Some facilities only hire journeyman craftsman because there is little or no basic crafts training required for these individuals to become productive employees. Some facilities only hire journeyman because this is the specific requirement for hiring crafts personnel from the Human Resources Department. Some facilities only hire journeyman because they require little or no training to perform basic jobs within the facility.

Some facilities hire journeyman craftsman and then place them into a training program which teaches the basic and specialized skills required to become journeyman. The rational behind doing the retraining of these individuals is that it is easier to retrain than it is to verify the training that these individuals received and the level of detail of that training.

Some facilities have apprenticeship programs in place to train personnel in specific crafts. The rationale behind having an apprenticeship program is that the facility can train the crafts personnel to the specific needs of the facility. Many facilities have had apprenticeship programs in the past, but due to budget reductions and downsizing do not have, nor do they anticipate having, apprentices in a specific craft in the near future.

All personnel hired to perform crafts work must receive the mandatory compliance training prior to performing work. This type of training was not included in the journeyman training requirements.

COMMERCIAL REACTOR FACILITY PRACTICES

Commercial nuclear plants have fundamentals courses or apprenticeship programs that teach the basic fundamentals of a craft. Mechanical maintenance fundamentals may include lubrication, hydraulics, pneumatics, bearings, mathematics, etc. The basic journeyman qualifications may include generic training on rigging, snubbers and

hangers, specific valves, piping components, heat exchangers and tanks, coupling alignment, pumps, air compressors, fans and blowers, etc. The selected (master, senior, or first class, etc.) journeyman qualifications may include specific component equipment such as containment hatches, scaffolding, hydrostatic testing, freeze seals, diesel repair, seals, and alignment of main coolant pumps, etc.

All crafts personnel, whether hired for a permanent position at a plant or hired for a shutdown, must complete the required crafts training. Those personnel hired for shutdowns do not necessarily complete all areas of training, but must complete training in those areas for which they were hired or successfully complete a performance evaluation (test out). For those tasks on which an individual has not been trained, the person is required to be under constant supervision by a qualified craftsperson while performing the task. Personnel can test out of different areas by completing the performance evaluation which are often job performance measures (JPMs).

Most commercial reactor plants have apprenticeship programs in place and some of these programs are accredited with the Institute of Nuclear Power Operations (INPO). Some of the commercial reactor plants do not take credit for their apprenticeship program because it is not accredited by INPO.

GENERAL FINDINGS

The following is provided as information only. Almost all facilities/sites throughout the DOE complex administer mandatory compliance training. This compliance training may consist of radiation worker, Hazard Communication (Hazcom), General Employee Training (GET), Hazardous Waste Operator (Hazwopper), building/facility specific GET, Occupational Safety and Health Administration (OSHA), safety, etc. At many facilities the bulk of the funding for maintenance training is spent on compliance training, and little if any actual maintenance training is conducted.

DOE facilities/sites that are required to accredit their maintenance training programs in accordance with DOE 5480.18A and/or are required to develop maintenance training programs in accordance with DOE 5480.20 have a much more involved qualification process than non-nuclear facilities which need to comply with DOE 4330.4A. DOE facilities/sites that meet the maintenance training and qualification program requirements of DOE 5480.18A or DOE 5480.20 also meet the training and qualification program requirements of DOE 4330.4A. Regardless of the DOE Order that must be complied with, the maintenance training program should develop and maintain the knowledge and skills required by maintenance personnel to effectively perform maintenance activities.

Maintenance Training Program

Thirty-five DOE facilities/sites were contacted to ascertain what kind of maintenance training programs were in place. Of these facilities/sites, 27 were in the development stage. The development stage varies from starting a needs analysis to determining the

kind of maintenance training program that should be developed, to 80 - 100 percent developed and 30 percent implemented.

Eight facilities/sites reported that formal maintenance training programs were not in place, but that some form of training is conducted or would be developed as soon as funding was obtained. Much of the training for these facilities was vendor-supplied training. Some of these facilities/sites conducted OJT, but did not feel that their OJT met the requirements set forth in DOE Orders. Therefore, they did not take credit for the training being conducted. One site conducts procedure training prior to any operation or maintenance evolution. This facility did not consider procedure training as part of their maintenance training program.

Training Setting

All of the DOE facilities/sites contacted have classroom training for required compliance training and the knowledge portion of OJT. Fifty-four percent of the facilities stated that a written examination was used to evaluate the trainee after the classroom training and that performance evaluations were used to evaluate OJT. Three percent of the facilities/sites conduct knowledge interviews to evaluate the trainees' knowledge after classroom training; however, 11% of the facilities do not test after all classroom training because the training is not specifically related to a compliance issue.

OJT is required by DOE Orders 4330.4A, 5480.18A, and 5480.20. Twenty-three percent of the facilities/sites contacted conduct task-related OJT, and 37% are in the process of establishing task-related OJT programs. The facilities/sites that have task-related OJT programs in place identified the tasks by conducting a job analysis. The resulting tasks were evaluated to establish training periodicity (pre-train, no-train, train, over-train). Eleven percent of the OJT conducted is not considered formal OJT and the facility does not take credit for having an OJT process in place. OJT is not considered as formal OJT because lesson plans and performance evaluations are not in place to ensure that the same training is administered each time the OJT is conducted.

Continuing Training

Continuing training is required by DOE Orders 4330.4A, 5480.18A, and 5480.20 to maintain and improve job-related knowledge and skills. The requirements of these Orders have been addressed by the facilities/sites that have developed or are developing maintenance training programs. All facilities/sites have established continuing training programs for compliance training, but not all facilities/sites have established continuing training programs for the maintenance training requirements of the DOE Orders listed above.

Seventeen percent of the facilities/sites have not decided what should be included in a continuing training program because of interpretation issues associated with the requirements of the DOE Orders. These facilities/sites have interpreted the DOE Orders as requiring continuing training programs to include all initial training plus any additional training required by the Orders. The DRAFT "Interpretative Guidance for the Implementation of DOE 5480.20 Qualification and Certification Requirements" addresses continuing training requirements and states that "Continuing training programs should be developed to maintain and build upon the knowledge and skills that were acquired during initial training. As such, they should not be a repeat of the initial training program." Thirty-one percent of the facilities/sites have not established continuing training program content because they are not far enough along in the development and implementation of their initial training program. Six percent of the facilities/sites review personnel performance or anticipate doing so to determine what training should be included in the continuing training program.

Testing/Evaluation

All facilities/sites that have established maintenance training programs or are developing maintenance training programs have or will have written tests and performance evaluations. Seven percent of the facilities/sites have not made a decision as to including job performance measures (JPMs) in their performance evaluation checklists. Fifteen percent of the existing facility/site programs do not use performance evaluation checklists, but plan on developing checklists which include JPMs. Seven percent of the facilities anticipate a comprehensive examination for the final evaluation, or already have them in place. Seven percent of the facilities review personnel performance or anticipate doing so to determine the content of the continuing training program.

Supervisor Training

Forty-six percent of the facilities/sites have maintenance supervisor training programs that include both craft training and supervisory skills training. The other facilities/sites have supervisor training only, no supervisor training, or supervisor training is in development. Those facilities which have "hybrid" maintenance crews, where different crafts such as mechanical, electrical, and instrumentation and control (I&C) are supervised by one supervisor, do not have a training program in place to cross-train the supervisor in all of the crafts that they supervise. Those facilities which have this situation are aware of the need to have a training program in place for supervisors, but have not developed a program to meet this need.

Requalification

Seventy-one percent of the facilities/sites do not have established requalification programs for maintenance personnel. Twenty-three percent of the facilities/sites contacted did not know what constitutes requalification of maintenance personnel. The facilities/sites that have established requalification programs stated that attending all of

the continuing training was sufficient for requalification. One facility requires the completion of an abbreviated examination of the initial training subjects to requalify maintenance personnel.

Safety-Related Systems Training

DOE 5480.20 requires that maintenance personnel receive systems training for those safety-related systems identified in the Safety Analysis Report (SAR). The reactor facilities have established safety-related systems training. The non-reactor facilities/sites either do not have established programs or are developing safety-related systems training programs.

DOE Order Compliance

Fifty-seven percent of the facilities/sites are working towards complying with DOE 4330.4A and/or 5480.20. The reactor sites are working towards complying with DOE 5480.18A with some sites trying to be exempted from accrediting their maintenance training programs. Those facilities/sites contacted that are not required to accredit their maintenance training programs are not sure which Order they would or should comply with. Although 4330.4A and 5480.20 are similar, some differences exist which cause most facilities/sites to work to meet the requirements of both Orders.

SUMMARY

The information contained in this paper is intended to provide the status of journeyman craftsman programs throughout the DOE Complex. The apprenticeship qualification requirements which enable personnel to become journeyman are comprehensive in nature and meet the DOE Order 5480.20 Category A Reactor requirements for education. The facilities/sites that address the journeyman issue use labor union craft employees. Most facilities/sites hire journeyman craftsman because there is little if any training necessary for these personnel to comply with DOE Orders. Many facilities/sites contacted have had an apprenticeship program in place in the past, but no longer have apprentices because of reduced budgets and downsizing of their facility/site staffs.

Attachment 1

29 CFR Part 29 Apprenticeship Standards

An apprenticeship program, to be eligible for registration/approval by a registration/approval agency, shall conform to the following standards;

(1) The employment and training of the apprentice in a skilled trade;

(2) A term of apprenticeship, not less than 2,000 hours of work experience, consistent with training requirements as established by industry practice;

(3) An outline of the work processes in which the apprentice will receive supervised work experience and training on the job, and the allocation of the approximate time to be spent in each major process;

(4) Provision for organized, related and supplemental instruction in technical subjects related to the trade. A minimum of 144 hours for each year of apprenticeship is recommended. Such instruction may be given in a classroom through trade or industrial courses, or by correspondence courses of equivalent value, or other forms of self-study approved by the registration/approval agency.

(5) A progressively increasing schedule of wages to be paid the apprentice consistent with the skill acquired. The entry wage shall be not less than the minimum wage prescribed by the Fair Labor Standards Act, where applicable, unless a higher wage is required by other applicable Federal law, State law, respective regulations, or by collective bargaining agreement;

(6) Periodic review and evaluation of the apprentice's progress in job performance and related instruction; and the maintenance of appropriate progress records;

(7) The numeric ratio of apprentices to journeyman consistent with proper supervision, training, safety, and continuity of employment and applicable provisions in collective bargaining agreements, except where such ratios are expressly prohibited by the collective bargaining agreements. The ratio language shall be specific and clear as to application in terms of jobsite, work force, department or plant;

(8) A probationary period reasonable in relation to the full apprenticeship term, with full credit given for such period toward completion of apprenticeship;

(9) Adequate and safe equipment and facilities for training and supervision, and safety training for apprentices on the job and in related instruction;

(10) The minimum qualifications required by a sponsor for persons entering the apprenticeship program, with an eligible starting age not less than 16 years;

(11) The placement of an apprentice under a written apprenticeship agreement as required by the State apprenticeship law and regulation, or the Bureau where no such State law or regulation exists. The agreement shall directly, or by reference, incorporate the standards of the program as part of the agreement;

(12) The granting of advanced standing or credit for previously acquired experience, training, or skills for all applicants equally, with commensurate wages for any progression step so granted;

(13) Transfer of employer's training obligation when the employer is unable to fulfill his obligation under the apprenticeship agreement to another employer under the same program with consent of the apprentice and apprenticeship committee or program sponsor;

(14) Assurance of qualified training personnel and adequate supervision on the job;

(15) Recognition for successful completion of apprenticeship evidenced by an appropriate certificate;

(16) Identification of the registration agency;

(17) Provision for the registration, cancellation and deregistration of the program; and requirement for the prompt submission of any modification or amendment thereto;

(18) Provision for registration of apprenticeship agreements, modifications, and amendments; notice to the registration office of persons who have successfully completed apprenticeship programs; and notice of cancellations, suspensions and terminations of apprenticeship agreements and causes therefor;

(19) Authority for the termination of an apprenticeship agreement during the probationary period by either party without stated cause;

(20) A statement that the program will be conducted, operated and administered in conformity with applicable provisions of 29 CFR part 30, as amended, or a State EEO in apprenticeship plan adopted pursuant to 29 CFR part 30 and approved by the Department;

(21) Name and address of the appropriate authority under the program to receive, process and make disposition of complaints;

(22) Recording and maintenance of all records concerning apprenticeship as may be required by the Bureau or recognized State agency and other applicable law.

Attachment 2

Facility	Apprenticeship Program in place	When hiring journeyman are they retrained or considered qualified because they are journeyman	If an apprenticeship program is in place is it in use	Order Comply With
West Valley	No apprenticeship program. Hire Journeyman with validated experience and training.	Journeyman are hired after meeting minimum requirements then complete compliance and administrative training.		4330.4A
Pinellas	No apprenticeship program. New hires paired with experienced personnel regardless of experience.	Don't hire journeyman (non-union) new hires receive the same training regardless of experience.		4330.4A
Paducah	State approved apprenticeship program for instrument, electrical, and mechanical.	Hire journeyman at a minimum skill level and then do site specific training.	YES in place and being used for in-house personnel.	4330.4A and 5480.20
Portsmouth	No apprenticeship program in place. Had a program in the past.	Hire journeyman at a minimum experience/skill level. Conduct fundamental and basic systems training.		4330.4A and will anticipate NRC requirements
Fernald	No apprenticeship program in place.	Hire journeyman craftsman and only do compliance training. Looking at additional training but this must be approved by the union.		Think will comply with 5480.20
Mound	No approved apprenticeship program in place. New hires paired with experienced personnel regardless of experience.	Usually hire journeyman at a minimum experience/skill level. Then conduct specific training for the area of expertise.		5480.18A and 4330.4A
Rocky Flats	Do have apprenticeship programs, 3 in use now.	Hire some journeyman but do not do any special training at this time but are developing this training.	In use for electrician, alarm technicians, and stationary operating engineers.	5480.20
Pantex	Do have apprenticeship programs.	Hire some journeyman, and conduct job specific training.	In use.	5480.20
Sandia	Do have an apprenticeship program, but do not use the program because of the cost. Hire journeyman who have been through an approved apprenticeship program.	Hire journeyman who have the minimum experience necessary.		4330.4A
Johnson Controls	Do have apprenticeship program in conjunction with the different unions.	Hire journeyman and do facility and compliance training.	In use.	4330.4A and 5480.20
WIPP	No apprenticeship program.	Hire mining journeyman with the necessary experience/skill and use a qual card training program.		5480.18A
Lawrence Livermore	Do have apprenticeship program for 8 positions with 6 in use now.	Hire journeyman and conduct facility and compliance training.	In use.	5480.18A
WHC	Do have apprenticeship programs for 18 crafts positions.	Retrain all new hire journeyman because its easier to retrain than to validate the training previously received.	Program is in use.	4330.4A and 5480.20 depending on facility
ATR	No apprenticeship program here, but the CFA does and that is where they get their crafts personnel.	Receive journeyman from the CFA craft pool, and retrain to ATR specific requirements.	In use at CFA.	4330.4A 5480.18A 5480.20
WINCO	Have a program, but has not been used for many years.	Hire journeyman and do compliance and building specific training.		4330.4A
ANL West	Have a program and is being used for electricians.	Hire journeyman and do necessary compliance training. Try to hire from within the company and use the apprenticeship program to train personnel.	In use for electricians.	4330.4A and 5480.20

Facility	Apprenticeship Program in place	When hiring journeyman are they retrained or considered qualified because they are journeyman	If an apprenticeship program is in place is it in use	Order Comply With
B&W	Have a program and is being used for electricians.	Journeyman are trained to the required compliance training. Have not hired anyone to complete this training.	Program in place for electricians, one apprentice has one year left in program.	4330.4A
Savannah River NMPD	YES and no. SR is non-union and does not call there personnel journeyman. SR has a core program which teaches the same basic classes as an apprenticeship program but is called a core program.			5480.18A
Savannah River core training	YES and no. SR is non-union and does not call there personnel journeyman. SR has a core program which teaches the same basic classes as an apprenticeship program but is called a core program.			5480.18A
Savannah River DWPF	YES and no. SR is non-union and does not call there personnel journeyman. SR has a core program which teaches the same basic classes as an apprenticeship program but is called a core program.			4330.4A not sure if they know where going 5480.18A is for accreditation
Savannah River high level waste	YES and no. SR is non-union and does not call there personnel journeyman. SR has a core program which teaches the same basic classes as an apprenticeship program but is called a core program.			4330.4A 5480.18A and 5480.20
Oakridge K-25	Have a program, but has not been used for several years because of the downsizing.	Have not hired any personnel for several years due to the downsizing so have no training taking place.		5480.20
Oakridge HFIR/X-10	Have a program, but has not been used for several years because of the downsizing.	Have not hired any personnel for several years due to the downsizing so have no training taking place.		5480.20
Oakridge Y-12	No apprenticeship program in place.	Hire journeyman but do not do any special training.		4330.4A and 5480.20
ANL-East	No apprenticeship program in place. Had a program in the past.	HR hires journeyman crafts personnel who meet the minimum experience requirements required and are tested. Additional training is mostly compliance training and any necessary plant specific training.		4330.4A
Brookhaven plant Engineering	Do have apprenticeship programs.	Hire journeyman and conduct site specific training.	Programs in use.	5480.20
Brookhaven HFBR	Not involved in the apprenticeship process, Central Shops does this training.			5480.20
Brookhaven central shops	Do have apprenticeship programs.	Hire journeyman and conduct site specific training.	Programs in use.	4330.4A
Grand Junction	No apprenticeship program.	Hire journeyman and expect these personnel to have all applicable skills for that trade. Do conduct compliance and site specific training.		4330.4A
REECo	Do have apprenticeship program in conjunction with the unions.	Hire journeyman and conduct some job specific training for some personnel depending on the job for which hired.	In use.	4330.4A
Raytheon	No maintenance personnel.			

Facility	Apprenticeship Program in place	When hiring journeyman are they retrained or considered qualified because they are journeyman	If an apprenticeship program is in place is it in use	Order Comply With
EG&G Energy Measurements	No apprenticeship program. Non-union do not have journeyman crafts classification.	Don't have journeyman classification. Some personnel have same level of qualifications as journeyman but classified different.		Not sure.
Princeton	No apprenticeship program.	Don't have journeyman classification. Use technicians to do work at the facility.		5480.20
Battelle PNL	Have an apprenticeship program	HR hires journeyman crafts personnel who meet the minimum experience requirements required and are tested. Additional training is mostly compliance training and any necessary "performance based training."	In place for in-house personnel to become journeyman craftsman.	4330.4A and 5480.20

ELECTRICAL
Stand-Alone Module

Pulling Wire
01411
15 hours

Covers procedures, set-ups and equipment used when pulling large and small wire: equipment selection and set-ups, including splicing methods: and the need for worker communication when pulling wire.

ELECTRICAL - YEAR I
21 modules
150 classroom hours

Safety
01101
5 hours
Covers requirements for safe working conditions on job-sites. OSHA requirements, safe procedures for using tools and equipment and recognition of unsafe conditions.

Tools of the Electrical Trade
01102
5 hours
Describes tools used in the trade.

Fractions
01102
12.5 hours
Covers theory, exercises and practical applications.

Introduction to the Trade
01104
2.5 hours
Provides a brief history of the development of electrical theory and the trade up to when electricity was made available to the public.

Introduction to Electrical Theory
01108
7.5 hours
Covers basic atomic theory as it applies to circuit analysis, basic electrical laws (Ohm's Law, Kirchhoff's Law) and a basis for sketching and analyzing circuits.

Electrical Sources and Distribution
01109
5 hours
Covers the differences between fossil fuel, hydroelectric and nuclear power plants:Transmission of electrical power across the country:and distribution techniques in the city.

Algebra
01110
12.5 hours
Provides theory and exercise in algebra, including a practical approach to solving equations.

Calculator Math
01111
7.5 hours
Covers calculator math with examples, solved problems and exercises oriented toward electrical calculations.

Series and Parallel DC Circuits
01112
7.5 hours
Analyzes series and parallel circuits. Electrical theory is coupled with the practical application of circuit reduction techniques.

DC Circuit Analysis
01113
15 hours
Applies techniques introduced in 01108 and 01112 to solve practical electrical problems as applied to branch circuits.

Applied Math
01114
5 hours
Covers use of skills learned in 01110 an 01111 to solve percentages, unit conversion and word problems.

Introduction to the National Electrical Code (NEC)
01115
5 hours
Covers NEC and Code Making Panels, NEC history and a detailed study of NEC articles 90, 100, 110, 200.

Employee, Employer and Customer Relations
01116
5 hours
Covers relationships between trainees and employers, co-workers, other trade workers and customers. Presents hypothetical situations which ask for judgement calls by trainees.

Magnetism
01120
5 hours
Provides a brief history of magnetism, magnetic theory and its application.

Wiring Devices
01214
7.5 hours

Describes electrical devices (switches, disconnects, receptacles), their application and NEC requirements.

Conduit: Types, Applications and Systems
01301
5 hours
Covers applications of installation of GRC. IMC. EMT.PVC and flexible conduit are described in this module, covering applicable sections of the NEC.

Boxes and Fittings
01302
5 hours
Covers boxes and fittings used on the job and the NEC requirements for sizing and use.

Services and NEC Article 230
01303
10 hours
Covers electrical service entrance equipment, introductory review of NEC 230 and descriptions of residential and commercial services.

Conduit Bending
01307
12.5 hours
Covers bending IMT, PVC and rigid conduit and procedures for laying out off-set, saddles, back to back, stub-up and kick bends.

Conductors, Insulation and NEC
Articles 300-310
01403
5 hours
Covers structure and sizing of electrical conductors, properties and application of insulations used for construction wiring and application of the NEC to conductors and insulation installation.

AC and NM Cable
01420
Covers applications of AC and NM cable and NEC installation requirements.

ELECTRICAL - YEAR II

20 modules
147.5 classroom hours

Instructor's Introduction to The WOL Electrical Curriculum
01100
5 hours equivalent

This module is for instructors only. It introduces the Electrical Curricula Mission Statement, outlines the entire four-year Electrical program, and offers numerous teaching tips. It is highly recommended that instructors read this Introduction before starting classes.

Blueprints
01105
15 hours
In this module, trainees will study the symbolic language of blueprints and their different components such as floor plans and elevations. This module is concerned with giving the electrical trainee a general overview of graphic representations and the relationship they have to the actual construction of a building. Floor plans, electrical symbols, and learning activities for reading and interpreting trade blueprints are covered. Four separate charts accompany the Student Module.

Schedules and Specifications
01107
2.5 hours
Prerequisite: 01105
This module examines in detail two very important components of construction drawings: schedules and specifications.

Introductions to AC
01117
5 hours
Prerequisite: 01108, 01109, 01112, 01113

The main focus of this module is to examine the general distribution of alternating current, basic generator principles and specific electrical characteristics of alternating current such as frequency, period, and effective voltage.

Ohm's Law for AC
01118
5 hours
Prerequisite: 01117
The purpose of this module is to examine in greater detail the difference in Ohm's Law as it applies to AC. An introduction to basic transformer theory is also given, along with a presentation on the basic formula for calculating values in step-up and step-down transformers.

Instruments and Meters
01119
5 hours
Prerequisites: 01118, 01120
This module introduces the most common instruments and meters used in the electrical trade.

Characteristics of Induction
01121
7.5 hours
Prerequisites:01118, 01120
This module explains the principles of induction and inductive reactance. The characteristics of current and voltage in inductive circuits as well as phase angels and their relationship to power factor are discussed.

AC Capacitance
01122
7.5 hours
Prerequisite: 01118
The principles and characteristics of capacitance and capacitive circuits are the subjects of this module. Safety procedures for handling capacitors are also provided.

Series and Parallel AC Circuits
01123
15 hours
Prerequisites: 01121, 01122
This module discusses the characteristics of current and voltage in series and parallel AC circuits. It includes a presentation of relevant applications and problems.

Overcurrent Protection
01201
5 hours
Prerequisites:01121, 01122
An introduction to overcurrent protective devices such as circuit breakers and fuses is presented in this module. The application and operating characteristics of these devices provide a foundation for later modules covering fuses and circuit breakers.

Fuses
01202
Prerequisites: 01201, 01403
The identification and uses of different classes of fuses are explained in this module. Procedures for correct fuses selection and placement are provided.

Circuit Breakers
01203
10 hours
Prerequisite:01202
The major purpose of this module is to facilitate the recognition and understanding of circuit breakers. Guidelines for circuit breaker maintenance, selection, and placement are explained.

Ducting
01306
5 hours
This module describes the methods and materials used for underground ducting and emphasizes NEC requirements, safety guidelines, and procedures for installation and wiring using underfloor raceways.

Cable Tray and Installation
01308
5 hours
This module identifies and describes cable tray and cable tray systems. Procedures for installation and NEC requirements are also provided.

Wireways and Surface Metal Raceways
01309
10 hours
This module identifies the types and characteristics of wireways and surface metal raceways and describes procedures for their installation.

Load Centers and Panelboards
01310
5 hours
Prerequisites: 01203, 01303, 01403
Information for the identification of panelboards, sub-panels, and load centers is the focus for this module.

Introduction to Grounding
01401
10 hour
Prerequisite:01117
This module discusses the theory of grounding and the material characteristics and installation of AC and DC system grounding conductors.It explains what grounding is and the difference between system grounding and equipment grounding. The purpose and theory of a good grounding circuit are stressed.

General Requirements of Wiring
01405
20 hours
Prerequisite: 01214, 01302, 01420
The focus of this module is on actual wiring installation as it applies to residential construction.

Metallic-Sheathed Cable
01409
2.5 hours
Prerequisites:01403, 01420
The module gives descriptions of each type of MSC and the general requirements for their installation.

Special Wires, Cables, and Cords
01410
5 hours
Prerequisites:01403, 01409, 01420
The identification, application and installation of special wires, cables, and cords are introduced in this module. Descriptions of how to make up cable and obtain strain relief are given.

ELECTRICAL - YEAR III

16 modules
145 classroom hours

Hazardous Locations
01125
5 hours
Prerequisites:01105, 01107
Covers different classifications, divisions and groups used to describe hazardous locations and characteristics and installation of related equipment.

Electrical Safety
01127
7.5 hours
Covers safety practices for trainees working with circuits of equipment in low voltage, high voltage and hazardous locations and instructions for disconnecting and labeling circuits, the use of ladders and scaffolds, and what to do in case an accident occurs.

Lighting Fundamentals
01204
5 hours
Prerequisites:01105, 01107, 01117, 01214
Covers types of lights and their characteristics: introduces criteria used for selecting a specified lighting system for a given demand.

Emergency an Standby Electrical Systems
01208
7.5 hours
Prerequisites:01108, 01123, 01204, 01301, 01302, 01307, 01310, 01401
Describes installation of emergency lighting systems, including emergency circuits in hospitals.

Fundamentals of DC Motors
01210
5 hours
Prerequisites:01117, 01120
Covers DC motors and basic operation and how electrical power is converted into mechanical power.

Residential Calculations
01215
15 hours
Prerequisites:01118, 01201, 01204, 01301, 01302, 01302, 01307, 01310, 01401
Covers calculating loads for types of residential circuits, including kitchen and laundry areas. Includes feeder calculations.

Fixed Electric Space Heating
01216
5 hours
Prerequisites:01108, 01112, 01118, 01121, 01203, 01210
Covers operating characteristics of electric resistance heat, controls used to regulate electric resistance heat.

Control of Motor Starting
01218
10 hours
Prerequisites:01108, 01112, 01118, 01123, 01210
Covers magnetic and manually operated controllers, control circuit vacuums, overhead devices and selection of controllers for motor starting.

Article 430 - Motor Circuits:
Introduction to Code
01221
2.5 hours
Prerequisites:01215, 01216
Explains and interprets Article 430 of the NEC.

Motor Circuits - AC Circuits
01222
10 hours
Prerequisites:01105, 01108, 01109, 01112, 01118, 01120, 01221, 01403
Covers operation and construction of AC motors.

Article 430 - Motor Circuits Wire Sizing
01223
5 hours
Prerequisites:01118, 0221, 01403
Covers correctly sized conductors for motor circuits.

Article 430 - Motor Circuits Overload Protection
01224
5 hours
01203, 01221, 01222
Covers application and selection of overload protection devices.

Motor Circuits Article 430, Short Circuit and Ground Fault Protection
01226

10 hours
Prerequisites:01108, 01118, 01202, 01224
Covers application, selection and placement of overcurrent devices for motor circuits and methods for calculating, placing and wiring overcurrent devices to a motor branch circuit.

General Requirements of Commercial Wiring
01406
35 hours
Prerequisites:01105, 01107, 01307, 01310, 01401
Covers specifications and blueprints that determine wiring sequences in commercial projects, including identification of rough-in procedures, different switching circuits and the different types of commercial services.

Busway Systems
01408
5 hours
Prerequisites:01105, 01107, 01403
Covers types and applications of busways: describes procedures for tapping power from the busway using different types of branch circuits: includes kitchen, laundry areas and feeder calculations.

ELECTRICAL - YEAR IV

13 modules
147.5 hours

Tools and Material Take-offs
01126
12.5 hours
Prerequisites:01105, 01107
Covers tools and materials needed for work, and preparation of tool and material take-offs for residential, commercial and industrial installations.

Reading Electrical Diagrams
01128
12.5 hours
Prerequisites:01105
Covers reading and interpreting one - line diagrams, ladder diagrams and schematics for troubleshooting circuits or systems.

Journeyperson Responsibilities
01129
15 hours
Prerequisite:01116
Covers types of leadership skills and attitudes expected of a journeyperson in the electrical trade, including completing work reports and change orders. The Critical Path Method (CPM) is used as a method for organizing work and solving management problems.

Low-voltage Lighting Control
01207
7.5 hours
Prerequisites:01107, 01123, 01128, 01215, 01405
Covers characteristics and installation procedures for single button relays, light touch and dimming systems, and operation and installation of line carrier systems.

Special Systems
01209
15 hours
Prerequisites:01123, 01223, 01301, 01307, 01301, 01307, 01310, 01405
Identifies the operation and installation of fire/burglar systems, communications systems, life systems and energy-management systems.

Transformer Principles and Types
01227
10 hours
Covers transformers, including current flow, transfer losses, cooling, transformer ratios, reducing transformers losses, terminal identification systems and insulation.

Transformer Connections
01223
10 hours
Prerequisites:01108, 01127, 01123, 01201, 01203, 01201
Covers types of transformers and transformer connection designs, safety procedures and NEC requirements for transformer placement and installation.

Solid State Fundamentals
01229
10 hours
Prerequisites:01108, 01112, 01118, 01122, 01123, 01128
Covers fundamentals of semi-conductors and electrical characteristics of semi-conductor devices.

Advanced Meter Applications
01231
20 hours
Prerequisites:01108, 01119, 01123, 01127, 01128, 01303, 01401
Covers characteristics and installation of digital and analog meters, meter loading of circuits and switchboard meters.

High Voltage Fundamentals

01407
12.5 hours
Prerequisites:01112, 01118, 01121, 01123, 01228, 01306
Covers construction of high voltage cables and splices, safe procedures for removing damaged lightning arresters, and testing and pulling high voltage cable.

Special Occupancies and Equipment
01415
12.5 hours
Prerequisites:01107, 01115, 01127, 01128, 01203, 01214, 01215, 01303
Describes wiring characteristics of swimming pools, hot tubs, electric signs, mobile home parks and health care facilities: explains applicable NEC sections.

Resistive Heating Cable
01416
7.5 hours
Prerequisites:01113, 01118, 01123, 01127, 01128, 01201, 01214, 01401
Covers characteristics and uses of heating cable and procedures for selecting and installing different heat tracing, deicing and restrictive heating systems.

Special Terminations
01417
7.5 hours
Prerequisites:01105, 01108, 01115, 01125
Covers three methods of making special terminations: high pressure: exothermic welding: and power-actuated charges: covers advantages/disadvantages of each termination type and procedures for making each type of termination.

Attachment 4

ELECTRICIAN

Work Process

		Minimum 3 Years	Maximum 4 Years
		Hours	
A.	Developing basic skills, use of tools and test equipment.	780	1038
B.	Installation of conduit, wire mold and cable tray	520	692
C.	Blueprint reading and wiring schematics and ability to work from them	130	173

D.	Installation and maintenance of lighting fixtures and associated controls, trouble shooting	258	346
E.	Motor and generator repair and trouble shooting and control equipment for motor and generator	1038	1384
F.	Battery banks	258	346
G.	General wiring installation for equipment and power including underground and overhead power distribution systems	1170	1557
H.	Panel wiring, meter installation and trouble shooting	519	692

	Minimum 3 Years	Maximum 4 Years
	Hours	
I. Specialized work:	1038	1384
1. Troubleshooting 2. Computer Systems 3. Invertor (solid state) 4. Crane controls (solid state) Evacuation and intercommunication systems Heating and refrigeration control systems, troubleshooting		
J. Miscellaneous works	519	692
1. Manipulators 2. Machine Tools 3. Cafeteria Equipment, etc.		
	6230	8304

PURPOSE

The purpose of this paper is to provide the status of the journeyman and apprenticeship qualifications at the various facilities/sites throughout the DOE complex. Other areas addressed are the type of a maintenance training program is in place (job, task/duty area, building/facility, or other), what type of training settings are used, what type of training is provided to supervisors, what type of continuing training program is in place, and to what DOE Order does the facility try to comply (DOE Order 4330.4A, 5480.18A, or 5480.20).

BACKGROUND

Those facilities/sites which conduct maintenance throughout the DOE complex are required to have qualified personnel conduct the maintenance. Personnel qualifications depend on how the facility/site interprets the qualification requirements. Most states and unions require a minimum amount of training and experience for an individual to be a journeyman craftsman. Some states require a state license or a minimum number of hours of training and a minimum number of hours on the job to be qualified. These requirements vary from state to state, or regional area, so individuals may have to requalify if moving to a different state or area.

Those facilities/sites which conduct maintenance throughout the DOE complex are required to have a maintenance training program in accordance with one or more of the DOE Orders. These Orders are DOE 4330.4A, MAINTENANCE MANAGEMENT PROGRAM, DOE 5480.18A, ACCREDITATION OF PERFORMANCE-BASED TRAINING FOR CATEGORY A REACTORS AND NUCLEAR FACILITIES, AND DOE 5480.20, PERSONNEL SELECTION, QUALIFICATION, TRAINING, AND STAFFING REQUIREMENTS AT DOE REACTOR AND NON-REACTOR NUCLEAR FACILITIES. Facilities/sites which accredit their maintenance program in accordance with DOE 5480.18A have a much more involved qualification process than those non nuclear facilities which need to comply with DOE 4330.4A. Whichever DOE Order must be followed, the maintenance training program should develop and maintain the knowledge and skills required by maintenance personnel to effectively perform maintenance activities.

APPRENTICESHIP PROGRAMS

The U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training (BAT) administers the requirements of 29 CFR Part 29, Labor Standards for the Registration of Apprenticeship Programs, which establishes the standards for apprenticeship programs. Attachment 1 addresses the standards an apprenticeship program must meet to be in compliance with 29 CFR Part 29. Apprenticeship programs are planned, administered, and paid for by the employer, employer associations, and sometimes labor unions. Apprenticeship programs are commonly registered with the BAT or a federally approved State apprenticeship

agency. Currently 27 states have federally approved apprenticeship agencies, other states have the BAT oversee their apprenticeship programs.

Registered programs meet federally approved standards relating to job duties, related instruction(a minimum of 144 hours a year is recommended), wages, and safety and health conditions. Apprentices who successfully complete registered programs receive certificates of completion from the BAT or a federally approved State apprenticeship agency. Registered programs offer apprenticeships in over 830 occupations.

Apprentices can be in registered programs sponsored jointly by employers and labor unions or operated by employer/employer associations. The administrative body in such programs are called Apprenticeship and Training Committee. Representing the union or management, the Apprenticeship Committee reviews applications for apprenticeships and interviews applicants. The Committee also consults with the BAT or a State apprenticeship counsel concerning apprenticeship standards, equal employment opportunity, safety and similar matters.

Apprenticeship is the relationship between an employer and an employee during which the worker, or apprentice learns an occupational trade. The training lasts a specified length of time. Apprenticeship covers all aspects of the trade and includes both on-the-job training and related instruction.
Related instruction generally takes place in a classroom after working hours. The teaching covers the techniques of the trade and also the theory behind the techniques. The training includes detailed discussion of how typical tasks are performed and the safety precautions that must be taken. Classes, which are taught by experienced craftworkers and other skilled persons, require the study of trade manuals and educational materials. Classes can be scheduled during the day or in the evening.

Apprenticeships usually last about four years but range from 1 to 6 years. During this time, apprentices work with journeyman workers, to achieve the skills and knowledge of the occupational trade. The apprentice gradually learns the mechanics of the trade and performs the work with less and less supervision.

REQUIRED TRAINING

Apprenticeship programs are registered with the BAT or a federally approved State apprenticeship agency. These programs must meet federally approved standards relating to instruction (a minimum of 144 hours a year is recommended). This instruction is usually off-the-job and held during the apprentices off work hours. The employer will normally pay for the classes, but if the apprentice does not satisfactorily pass the class, they may have to pay for the class. If an apprentice fails to pass a class an interview with the Apprenticeship and Training Committee may be conducted to verify that the apprentice is suitable to stay in the apprenticeship program.

Apprentices are required to achieve a minimum grade when attending classes, normally a minimum of 75% or 80% passing grade. The apprentices are required to attend a least some minimum amount of the required classes, 80% or 90%. The

availability of the classes is the responsibility of the Apprenticeship and Training Committee. Appendix A shows examples of the courses required for the electrician and maintenance mechanics and the required number of hours for these courses.

Many apprenticeship programs are administered through local vocational schools or colleges. Some colleges allow apprentices to obtain Associate of Applied Science Degrees by taking an additional 12-15 credit hours of an approved curriculum after successfully completing a certified BAT apprenticeship program.

WORK EXPERIENCE

Registered apprenticeship programs must meet federally approved standards relating to job duties (work process). The work process is normally on-the-job instruction where an apprentice is shown and performs predefined work processes for the apprenticeship program. The work process includes the basic skills, use of tools and equipment and other work processes which have been approved by the BAT or a federally approved State apprenticeship agency. The various work processes are assigned an approximate number of hours of learning. The order in which the work training experience is obtained need not follow the sequence of the work process schedule, but during the term of apprenticeship the apprentice will be given at least the minimum number of hours of experience scheduled for each process. The work process hours are totaled and the hours are registered with the approved apprenticeship program as the minimum work training experience required for apprenticeship programs.

It is the responsibility of the apprentice to record the number of hours worked in each work process and have this reviewed periodically by their foreman or supervisor. The Apprenticeship Committee also reviews the apprentices record book to ensure the apprentice is fulfilling their obligation to the apprenticeship program. Appendix B has examples of the work processes required for electricians and maintenance mechanics and the required number of hours for each work process.

APPRENTICESHIP COMPLETION

The apprentice receives a Certificate of Completion of Apprenticeship from the BAT or a federally approved State Apprenticeship agency. To complete the apprenticeship the apprentice will have to take a comprehensive examination and/or a practical evaluation with a passing grade of 80% or better. The apprenticeship Committee reviews the apprentices record book and the final evaluation (written examination and/or practical evaluation) and presents the Certificate of Completion of Apprenticeship when all requirements have been completed.

OTHER JOURNEYMAN QUALIFICATIONS

Many unions allow individuals who have not gone through an approved apprenticeship program to join the union. The requirements to become a journeyman include having a notarized affidavit stating that the minimum number of years of required experience

have been completed. Most unions require the individual to complete the same final apprenticeship test with the same minimum passing grade and complete a practical evaluation before being considered for entry into the union as a journeyman craftsman. After completing the minimum requirements to enter a union, an initiation fee is required from the individual after approval is obtained to join the union as a qualified journeyman. Unions do this to ensure that only qualified personnel are journeyman craftsman.

DOE FACILITY PRACTICES

Some DOE facilities have apprenticeship programs in place to train personnel in specific crafts. while other DOE facilities hire only journeyman crafts personnel then train the personnel to the specific requirements of the facility. Many sites have had apprenticeship programs in place in the past but due to downsizing of some sites have not had and do not anticipate any apprentices in a specific craft. Those facilities which only hire journeyman craftsman do so knowing the training requirements of union journeyman and as such do not have to train these personnel in their trade only train them in facility specific areas.

COMMERCIAL REACTOR FACILITIES

Most commercial reactor facilities have apprenticeship programs in place and some of these programs are accredited with the Institute of Nuclear Power Operations (INPO). Some commercial reactor plants do not take credit for the apprenticeship program because it is not accredited while other plants apprenticeship programs are accredited. Commercial nuclear facilities have a fundamentals course or apprenticeship program that teach the basic fundamentals of a craft.

The areas for mechanical maintenance may include lubrication, hydraulics, pneumatics, bearings, mathematics, etc. The basic journeyman qualifications may include generic training on rigging, snubbers and hangars, specific valves (swing check, diaphragm, flow control, relief, air operated, etc) piping components, heat exchangers and tanks, coupling alignment, pumps (positive displacement, centrifugal, gear, etc.), air compressors, fans and blowers, etc. The select (master, senior, or first class, etc.) journeyman qualifications may include specific component equipment such as containment hatches, scaffolding, hydrostatic testing, freeze seals, diesel repair, seals and alignment of main coolant pumps, etc.

All crafts personnel, whether hired for a permanent position at a plant or hired for a shutdown must complete the required crafts training. Those personnel hired for shutdowns may not complete all areas of training but will complete those areas for which they were hired or complete the performance evaluation (test out). Those not trained need constant supervision while working on any equipment. Personnel can test out of the different areas by completing the performance evaluation with job performance measures (JPMs).

GENERAL FINDINGS

Almost all facilities/sites throughout the DOE complex administer the mandatory compliance training. This compliance training may consist of radiation worker, Hazard Communication (Hazcom), General Employee Training (GET), Hazardous Waste Operator (Hazwopper), building/facility specific GET, Occupational Safety and Health Administration (OSHA) required, safety, etc. At many facilities the bulk of the funding for maintenance training is spent on compliance training, and little if any actual maintenance training is conducted.

Maintenance Training Program

Many facilities/sites were contacted (35) to find out what kind of maintenance training program was in place. Of these facilities/sites, 27 were in the development stage of the maintenance training program. The development stage varies from starting a needs analysis to determine what kind of a maintenance training program should be developed, to 80 to 100 percent developed, and 30 percent implemented.

Eight facilities/sites stated that a formal maintenance training program was not in place but some form of maintenance training was conducted or that a maintenance training program would be developed as soon as funding was obtained. Much of the training for these facilities was vendor-supplied training on a new piece of equipment or identified necessary training. Some of these facilities/sites conducted OJT training, but did not feel that this OJT met the requirements set forth in the various DOE Orders. Therefore they did not want to take credit for the training being conducted. One site conducted procedure training when conducting any operation or maintenance evolution. This facility did not consider procedure training as part of their maintenance training program.

Training Setting

Most of the facilities/sites contacted had classroom training for the compliance training and the knowledge training of OJT. Most stated that a written examination was used to evaluate the trainee after the classroom training and that performance evaluations were used to evaluate, OJT. Some facilities conduct knowledge interviews to evaluate the trainees knowledge after classroom training. Some facilities do not test after each classroom training session because the training is not required training per a specific compliance training issue and therefore no testing is conducted.

Many of the facilities/sites contacted were establishing or already had task training OJT. On-the-job training is required in all three DOE Orders that address maintenance training. These tasks were identified by conducting a job analysis and identifying task lists which were then evaluated for pre-train, no-train, train, over-training of the task.

Some of the OJT conducted is not in a formal process and the facility does not take credit for having an OJT process in place. The reason the OJT is not formal is that no lesson plan with a performance evaluation is in place to ensure that the same training is administered each time the OJT is conducted.

Continuing Training

The continuing training requirements required by DOE Orders 4330.4A, 5480.18A, and 5480.20 to maintain and improve job-related knowledge and skills was addressed by those facilities/sites developing maintenance training programs. All facilities/sites have a continuing training program which includes the compliance training requirements, but not all facilities/sites have a continuing training program for the maintenance training requirements. Some facilities/sites have not decided what training should be included in the continuing training program, because their interpretation of the DOE Orders are that all initial training should be included in the continuing training program, plus any additional training identified as required. The DRAFT "Interpretative Guidance for the Implementation of DOE 5480.20 Qualification and Certification Requirements" addresses the continuing training requirements and states that "Continuing training programs should be developed to maintain and build upon the knowledge and skills that were acquired during initial training. As such, they should not be a repeat of the initial training program." Some facilities/sites have not established what will be in their continuing training program because they are not far enough along in their maintenance training program. Some facilities review personnel performance or anticipate doing so to determine what training should be included in the continuing training program.

Testing/Evaluation

All facilities that are developing a maintenance training program have or will have written tests for classroom training and have or will have performance evaluations for OJT. Some of the facilities/sites have not decided whether to have job performance measures (JPMs) included in the performance evaluation checklist. Some of the programs already in place do not have performance evaluation checklists, but the facilities anticipate making these checklists with JPMs included. Some facilities anticipate a comprehensive examination for the final evaluation, or already have this in place. Some facilities review personnel performance or anticipate doing so to determine the content of the continuing training program.

Supervisor Training

Most facilities/sites have maintenance supervisor training which includes both craft training and supervisory skills training. Some facilities/sites have only supervisory

training for the maintenance supervisors. Some facilities/sites have no supervisory training or the training is in development. Those facilities which have "hybrid" maintenance crews where different crafts such as mechanical, electrical, and instrumentation and control (I&C) are supervised by one supervisor do not have a training program in place to cross train the supervisor in all of the crafts that they supervise. Those facilities which have this situation are aware of the need to have a training program in place for supervisors but have not developed a program to meet this need.

Requalification

Most facilities/sites do not have a requalification program established to requalify maintenance personnel. Most facilities/sites contacted did not know what would constitute requalification of maintenance personnel. Those facilities which requalify personnel stated that attending all of the continuing training was sufficient for requalification. One facility gives an abbreviated examination of the initial training subjects to requalify maintenance personnel.

Safety-Related Systems Training

DOE 5480.20 requires that maintenance personnel receive systems training for those safety-related systems identified in their Safety Analysis Report (SAR). Most reactor facilities have safety-related systems training. Those facilities/sites without a reactor do not have, or are developing, a safety-related systems training program.

DOE Order Compliance

Most facilities/sites are working towards complying with DOE 4330.4A and/or 5480.20. Most reactor sites are working towards complying with DOE 5480.18A with some sites trying to be removed from the requirement of accrediting their maintenance training programs. Those facilities/sites contacted not requiring accreditation were not sure which Order they would or should comply with. Although 4330.4A and 5480.20 are similar, some differences were noted which caused most facilities/sites to work to meet the requirements of both Orders.

SUMMARY

The areas covered in this paper have been provided to assist in the status of the maintenance training programs throughout the DOE Complex. Those facilities/sites who must comply with DOE Order 5480.20 anticipate that they must also comply with DOE Order 4330.4A. Those facilities/sites which address the journeyman crafts issue have union craft employees. Most facilities/sites hire journeyman craftsman because

there is little if any training necessary for these personnel. Most facilities/sites contacted have had an apprenticeship program in place in the past but no longer have any apprentices because of the downsizing of their site or because no new employees have been hired for a long time. Most sites are conducting or have conducted job/task analyses to implement OJT training in their initial and continuing training programs. Most facilities/sites have written examinations after classroom training and those who have an OJT program use performance evaluations to evaluate OJT.

Attachment 1

29 CFR Part 29 Apprenticeship Standards

(1) The employment and training of the apprentice in a skilled trade;

(2) A term of apprenticeship, not less than 2,000 hours of work experience, consistent with training requirements as established by industry practice;

(3) An outline of the work processes in which the apprentice will receive supervised work experience and training on the job, and the allocation of the approximate time to be spent in each major process;

(4) Provision for organized, related and supplemental instruction in technical subjects related to the trade. A minimum of 144 hours for each year of apprenticeship is recommended. Such instruction may be given in a classroom through trade or industrial courses, or by correspondence courses of equivalent value, or other forms of self-study approved by the registration/approval agency.

(5) A progressively increasing schedule of wages to be paid the apprentice consistent with the skill acquired. The entry wage shall be not less than the minimum wage prescribed by the Fair Labor Standards Act, where applicable, unless a higher wage is required by other applicable Federal law, State law, respective regulations, or by collective bargaining agreement;

(6) Periodic review and evaluation of the apprentice's progress in job performance and related instruction; and the maintenance of appropriate progress records;

(7) The numeric ratio of apprentices to journeyman consistent with proper supervision, training, safety, and continuity of employment and applicable provisions in collective bargaining agreements, except where such ratios are expressly prohibited by the collective bargaining agreements. The ratio language shall be specific and clear as to application in terms of jobsite, work force, department or plant;

(8) A probationary period reasonable in relation to the full apprenticeship term, with full credit given for such period toward completion of apprenticeship;

(9) Adequate and safe equipment and facilities for training and supervision, and safety training for apprentices on the job and in related instruction;

(10) The minimum qualifications required by a sponsor for persons entering the apprenticeship program, with an eligible starting age not less than 16 years;

(11) The placement of an apprentice under a written apprenticeship agreement as required by the State apprenticeship law and regulation, or the Bureau where no such State law or regulation exists. The agreement shall directly, or by reference, incorporate the standards of the program as part of the agreement;

(12) The granting of advanced standing or credit for previously acquired experience, training, or skills for all applicants equally, with commensurate wages for any progression step so granted;

(13) Transfer of employer's training obligation when the employer is unable to fulfill his obligation under the apprenticeship agreement to another employer under the same program with consent of the apprentice and apprenticeship committee or program sponsor;

(14) Assurance of qualified training personnel and adequate supervision on the job;

(15) Recognition for successful completion of apprenticeship evidenced by an appropriate certificate;

(16) Identification of the registration agency;

(17) Provision for the registration, cancellation and deregistration of the program; and requirement for the prompt submission of any modification or amendment thereto;

(18) Provision for registration of apprenticeship agreements, modifications, and amendments; notice to the registration office of persons who have successfully completed apprenticeship programs; and notice of cancellations, suspensions and terminations of apprenticeship agreements and causes therefor;

(19) Authority for the termination of an apprenticeship agreement during the probationary period by either party without stated cause;

(20) A statement that the program will be conducted, operated and administered in conformity with applicable provisions of 29 CFR part 30, as amended, or a State EEO in apprenticeship plan adopted pursuant to 29 CFR part 30 and approved by the Department;

(21) Name and address of the appropriate authority under the program to receive, process and make disposition of complaints;

(22) Recording and maintenance of all records concerning apprenticeship as may be required by the Bureau or recognized State Apprenticeship Agency and other applicable law.

Attachment 2

Facility	Apprenticeship Program in place	When hiring journeyman are they retrained or considered qualified because they are journeyman	If an apprenticeship program is in place is it in use	Order Comply With
West Valley	No apprenticeship program. Hire Journeyman with validated experience and training.	Journeyman are hired after meeting minimum requirements then complete compliance and administrative training.		4330.4A
Pinellas	No apprenticeship program. New hires paired with experienced personnel regardless of experience.	Don't hire journeyman (non-union) new hires receive the same training regardless of experience.		4330.4A
Paducah	State approved apprenticeship program for instrument, electrical, and mechanical.	Hire journeyman at a minimum skill level and then do site specific training.	YES in place and being used for in-house personnel.	4330.4A and 5480.20
Portsmouth	No apprenticeship program in place. Had a program in the past.	Hire journeyman at a minimum experience/skill level. Conduct fundamental and basic systems training.		4330.4A and will anticipate NRC requirements
Fernald	No apprenticeship program in place.	Hire journeyman craftsman and only do compliance training. Looking at additional training but this must be approved by the union.		Think will comply with 5480.20
Mound	No approved apprenticeship program in place. New hires paired with experienced personnel regardless of experience.	Usually hire journeyman at a minimum experience/skill level. Then conduct specific training for the area of expertise.		5480.18A and 4330.4A
Rocky Flats	Do have apprenticeship programs, 3 in use now.	Hire some journeyman but do not do any special training at this time but are developing this training.	In use for electrician, alarm technicians, and stationary operating engineers.	5480.20
Pantex	Do have apprenticeship programs.	Hire some journeyman, and conduct job specific training.	In use.	5480.20
Sandia	Do have an apprenticeship program, but do not use the program because of the cost. Hire journeyman who have been through an approved apprenticeship program.	Hire journeyman who have the minimum experience necessary.		4330.4A
Johnson Controls	Do have apprenticeship program in conjunction with the different unions.	Hire journeyman and do facility and compliance training.	In use.	4330.4A and 5480.20
WIPP	No apprenticeship program.	Hire mining journeyman with the necessary experience/skill and use a qual card training program.		5480.18A
Lawrence Livermore	Do have apprenticeship program for 8 positions with 6 in use now.	Hire journeyman and conduct facility and compliance training.	In use.	5480.18A
WHC	Do have apprenticeship programs for 18 crafts positions.	Retrain all new hire journeyman because its easier to retrain than to validate the training previously received.	Program is in use.	4330.4A and 5480.20 depending on facility
ATR	No apprenticeship program here, but the CFA does and that is where they get their crafts personnel.	Receive journeyman from the CFA craft pool, and retrain to ATR specific requirements.	In use at CFA.	4330.4A 5480.18A 5480.20
WINCO	Have a program, but has not been used for many years.	Hire journeyman and do compliance and building specific training.		4330.4A
ANL West	Have a program and is being used for electricians.	Hire journeyman and do necessary compliance training. Try to hire from within the company and use the apprenticeship program to train personnel.	In use for electricians.	4330.4A and 5480.20

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B&W	Have a program and is being used for electricians.	Journeyman are trained to the required compliance training. Have not hired anyone to complete this training.	Program in place for electricians, one apprentice has one year left in program.	4330.4A
Savannah River NMPD	YES and no. SR is non-union and does not call there personnel journeyman. SR has a core program which teaches the same basic classes as an apprenticeship program but is called a core program.			5480.18A
Savannah River core training	YES and no. SR is non-union and does not call there personnel journeyman. SR has a core program which teaches the same basic classes as an apprenticeship program but is called a core program.			5480.18A
Savannah River DWPF	YES and no. SR is non-union and does not call there personnel journeyman. SR has a core program which teaches the same basic classes as an apprenticeship program but is called a core program.			4330.4A not sure if they know where going 5480.18A is for accreditation
Savannah River high level waste	YES and no. SR is non-union and does not call there personnel journeyman. SR has a core program which teaches the same basic classes as an apprenticeship program but is called a core program.			4330.4A 5480.18A and 5480.20
Oakridge K-25	Have a program, but has not been used for several years because of the downsizing.	Have not hired any personnel for several years due to the downsizing so have no training taking place.		5480.20
Oakridge HFIR/X-10	Have a program, but has not been used for several years because of the downsizing.	Have not hired any personnel for several years due to the downsizing so have no training taking place.		5480.20
Oakridge Y-12	No apprenticeship program in place.	Hire journeyman but do not do any special training.		4330.4A and 5480.20
ANL-East	No apprenticeship program in place. Had a program in the past.	HR hires journeyman crafts personnel who meet the minimum experience requirements required and are tested. Additional training is mostly compliance training and any necessary plant specific training.		4330.4A
Brookhaven plant Engineering	Do have apprenticeship programs.	Hire journeyman and conduct site specific training.	Programs in use.	5480.20
Brookhaven HFBR	Not involved in the apprenticeship process, Central Shops does this training.			5480.20
Brookhaven central shops	Do have apprenticeship programs.	Hire journeyman and conduct site specific training.	Programs in use.	4330.4A
Grand Junction	No apprenticeship program.	Hire journeyman and expect these personnel to have all applicable skills for that trade. Do conduct compliance and site specific training.		4330.4A
REECo	Do have apprenticeship program in conjunction with the unions.	Hire journeyman and conduct some job specific training for some personnel depending on the job for which hired.	In use.	4330.4A
Raytheon	No maintenance personnel.			

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EG&G Energy Measurements	No apprenticeship program. Non-union do not have journeyman crafts classification.	Don't have journeyman classification. Some personnel have same level of qualifications as journeyman but classified different.		Not sure.
Princeton	No apprenticeship program.	Don't have journeyman classification. Use technicians to do work at the facility.		5480.20
Battelle PNL	Have an apprenticeship program	HR hires journeyman crafts personnel who meet the minimum experience requirements required and are tested. Additional training is mostly compliance training and any necessary "performance based training."	In place for in-house personnel to become journeyman craftsman.	4330.4A and 5480.20